In conclusion, it must be stated that if the method here described proves of value the chief credit is due to the teachings of Cannon and of Pfaff, of which it is but a practical application.

NOTE.—While the proof-sheets of this article were in hand a third patient, omitted by oversight from this group. called for advice in an acute respiratory infection. In February, 1911, at operation for gallstones, a duodenal ulcer was found, and on his leaving the hospital the ox-bile treatment was given. Since then he has not had to consider his digestion except to take an occasional dose of sodium bicarbonate after indiscretions in diet.

OBSERVATIONS ON THE INTESTINAL BACTERIA IN PELLAGRA.[1]

By W. J. MacNeal, Ph.D., M.D.,

PROFESSOR OF PATHOLOGY AND BACTERIOLOGY AND ASSISTANT DIRECTOR OF THE LABORATORIES, NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL.

(From the Laboratories of the New York Post-Graduate Medical School and Hospital.)

A GENERAL survey of the fecal bacteria in pellagra was undertaken in 1910 and 1911 by the Illinois State Pellagra Commission. A brief summary of that work has been published[2] and the detailed record of the work has also recently appeared.[3] In general it was ascertained that the fecal bacteria in pellagra, when examined directly with the microscope, are different from the normal in their quantitative relationships, and that unusual kinds of bacteria, more or less heterogeneous in nature, are present. The cultural tests also brought to development unusual quantities of certain normal types, Bacillus bifidus, Bacillus welchii, and micrococci, in some cases, as well as a considerable variety of bacterial forms not ordinarily found in the feces of healthy men. None of these changes appeared to be constant. During the acute attack accompanied by diarrhea the Gram-positive cocci were nearly always abnormally numerous, and the Gram-negative bacilli were less numerous than normal in these cases. These changes were also observed in the subacute cases and even persisted to a slight degree after recovery from the skin lesions. The percentage of these cocci and bacilli are indicated in Chart I, along with data of similar observations on healthy men[4] for comparison. These changes, which were nearly constant, were such as might be expected as a natural result of the digestive derangement. There was no indication of a substitution of the normal intestinal bacteria by an abnormal invader. The abnormal types were various in nature and in no case dominant in numbers.

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[1] This paper forms a part of the progress report of the Thompson-McFadden Pellagra Commission of the New York Post-Graduate Medical School.

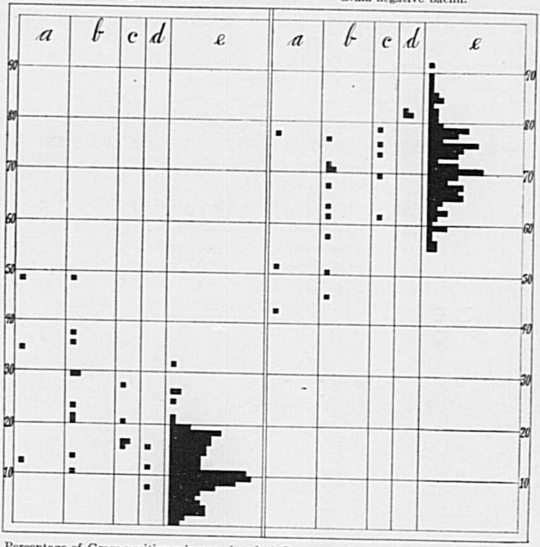
[2] Pellagra in Illinois, Arch. Int. Med., August and September, 1912, x, 123 to 168, 219 to 249.

[3] Report of the Pellagra Commission of the State of Illinois, Springfield, Illinois. 1912.

[4] Jour. Infect. Dis., April, 1909, vi, 123 to 169.

CHART I.—Percentage of gram-positive cocci and of Gram-negative bacilli in the feces.

Gram-positive cocci. Gram-negative bacilli.



Percentage of Gram-positive micrococci and of Gram-negative bacilli in the feces: (*a*) three examinations in acute pellagra; (*b*) ten examinations in subacute pellagra; (*c*) four examinations after recent recovery from pellagra; (*d*) three examinations in insane individuals not pellagrins; (*e*) one hundred and thirty-seven examinations in healthy men. The data for *a*, *b*, *c*, and *d* are taken from MacNeal, Allison, and York, Report of the Pellagra Commission of the State of Illinois, Springfield, 1912, pp. 55 to 160, and the data for *e* from MacNeal, Latzer, and Kerr, the Fecal Bacteria of Healthy Men, Jour. Infect. Dis., 1909, vi, 123 to 169.

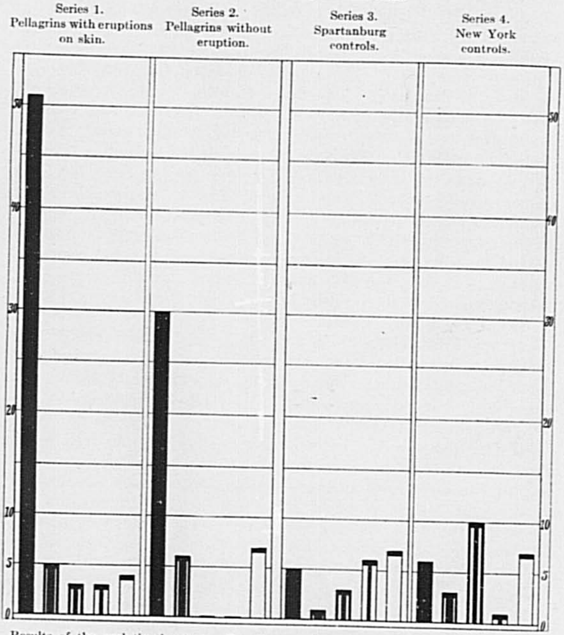
During the course of the primary examinations subcultures were made from a number of colonies and preserved for subsequent study. One hundred of these bacterial strains were subjected to agglutination tests, using the blood serum from cases of pellagra and from normal individuals. Three of the one hundred strains reacted in a somewhat suggestive manner. These were strains Nos. 14, 35, and 67. All were derived from cases of pellagra at

Peoria, Illinois. They were agglutinated by sera of pellagrins at Peoria, at Kankakee, and at Chicago. The suggestion of a specific relationship to the disease was considerably weakened by the fact that these bacteria were also agglutinated by the sera of insane patients, not pellagrins, at Peoria and at Kankakee, and by the sera of apparently normal persons at Kankakee, Chicago, and Urbana, Illinois. Two of these bacterial strains, Nos. 14 and 67, appear to be identical in nature. The organism is a short rod about 4.0 μ long by 1.4 μ thick on the average. The size is variable, however, variations in length from 2.4 to 6.2 μ, and in thickness from 1.0 to 1.6 μ being observed in young vigorous cultures. Gelatin is not liquefied. In litmus milk the organism grows without producing an acid reaction. There is slight coagulation after four days and a slow digestion of the casein. No gas is produced in broth containing dextrose, levulose, lactose, saccharose, or maltose. Fresh cultures on agar are colorless, but later assume an orange color, and this production of pigment seems to become more pronounced with continued artificial culture. Strains Nos. 14 and 67 agree in all these characters, and strain No. 35 in all except the pigment production. It has remained colorless. Inoculation of animals (guinea-pigs, rabbits, and monkeys) has been followed by loss of weight, but has not resulted in the death of any animal.

Further study along these lines has been undertaken by the Thompson-McFadden Pellagra Commission at the New York Post-Graduate Medical School during the summer of 1912. The opportunity was here presented to test this culture against the sera of pellagrins from a different part of the country, South Carolina. These recent cases have been divided into four series: First, 66 pellagrins showing lesions on the skin at the time the blood was taken; second, 43 pellagrins who did not show an eruption at the time but in whom a reliable history of the disease was obtained; third, 22 individuals living in the pellagrous district, Spartanburg County, South Carolina, but free from any sign or definite history of the disease; fourth, 27 individuals in New York, including clinic patients and some physicians who kindly furnished their own blood for this work. The agglutination tests were performed by the macroscopic method, a suspension of the bacteria in salt solution being mixed with an equal volume of a 20 per cent. solution of the serum in a small tube for each test, the final dilution of the serum being one part in ten. It was incubated for an hour and the progress of events recorded at intervals of fifteen minutes. Complete clumping and precipitation of the bacteria to the bottom of the tube was recorded as a complete reaction. Grades of almost complete, marked, slight, and negative were also distinguished. The results are shown graphically in Chart II.

Of the 66 sera in the first series, from pellagrins with the skin eruption, 51 gave complete agglutination, 5 almost complete, 3 slight, and 4 negative reactions. The 43 sera of the second series gave reactions distributed as follows: complete 30, almost complete 6, marked none, slight none, negative 7. Of the whole 109 different sera from pellagrins, 74.3 per cent. gave complete agglutination, 10.1 per cent. almost complete, 2.7 per cent. marked, 2.8 per cent. slight, and 10.1 per cent. negative reactions. The 22 sera of the third series, non-pellagrins of South Carolina, gave 5 complete agglutinations, 1 almost complete, 3 marked, 6 slight, and 7 negative reactions. The 27 New York controls gave 6 complete agglutinations, 3 almost complete, 10 marked, 1 slight, and

CHART II.—Results of agglutination tests.



Results of the agglutination tests. Complete reactions (1) in solid black at the left in each series; then in order (2) almost complete, (3) marked, (4) slight, and (5) negative reactions.

7 negative reactions. Of the total 49 controls, 22.5 per cent. gave complete agglutination, 8.2 per cent. almost complete, 26.5 per cent. marked, 14.3 per cent. slight, and 28.5 per cent. negative results. These findings are obviously not sufficiently clear-cut to warrant the assumption of a specific agglutination reaction of this bacterium with the serum of pellagrins, and yet they are such as to stimulate further work along this line.

The conservatism of this statement is not due to the fact that we have employed serum dilutions of one in ten instead of higher dilutions, for many of these positive sera have been tested in higher dilutions, up to one in four hundred, and have produced definite agglutination in such strength. The suggestion of specificity is, however, seriously opposed by the fact that sera from apparently normal individuals give precisely parallel results in some instances.

We have attempted to employ the complement-fixation test on a number of sera, using an antigen prepared from a culture of strain No. 67. Positive results have been obtained in a few cases, but it has not been possible to try it in a sufficient number of cases to determine the value of the test. We are also attempting to perfect a precipitin test. We hope that it may be possible, by employing these in conjunction with the agglutination test, to obtain more decisive results during the coming pellagra season.

A few cutaneous and intracutaneous tests on patients were performed during the year of 1912, using a vaccine made from a culture of strain No. 67. Of the 9 patients to whom the cutaneous test was applied, 1 gave a moderate reaction, 3 a slight reaction, and 5 were negative. The intracutaneous test on the same 9 patients gave a marked reaction in 1; a marked and a moderate reaction in another case in 2 tests; a slight reaction in 3 cases; a slight reaction and a negative reaction in another case in 2 tests; and a negative reaction in the 3 remaining cases; 2 controls gave negative results, one of them in two tests. The behavior of the cases, especially those on whom the test was repeated, seemed to suggest a difference in the reaction according to the stage of the disease, but the cases tested are still too few to bear analysis along this line.

While these various experiments with this culture were in progress we have undertaken to isolate further bacterial strains from the intestinal contents of pellagrins brought to New York for study. These cultures have been isolated by the methods previously employed, more especially by plating on blood-agar and ascitic-fluid-agar, from the feces, and also from the intestinal juice obtained through the Einhorn duodenal tube; 693 new bacterial strains were isolated in this way during 1912, and these have been tested against sera of pellagrins and others in approximately 2000 agglutination tests. This work is not yet completed, but it seems certain that we have failed to isolate any germ similar to strain No. 67 from the feces of these new cases. From the duodenal fluid, however, a few strains have been obtained which have given positive agglutination tests with the serum of cases of pellagra, and which seem to agree in their biologic characters, so far as they have been tested, with strain No. 67.

It is evident that this phase of the investigation is in an unfinished condition, and we do not wish to draw any definite conclusions at this time. This report will give an idea of one of the avenues along which we have approached the possible bacteriologic phase of the problem of pellagra, and indicates one of the lines we hope to follow during the present year.

THE RATIONAL TREATMENT OF TETANUS, WITH A REPORT OF TWENTY-THREE CASES FROM THE EPISCOPAL HOSPITAL, PHILADELPHIA.[1]

By Astley Paston Cooper Ashhurst, M.D.,
INSTRUCTOR IN SURGERY IN THE UNIVERSITY OF PENNSYLVANIA; ASSOCIATE SURGEON TO THE EPISCOPAL HOSPITAL, ETC.,
AND
Rutherford Lewis John, M.D.,
RESIDENT PHYSICIAN, EPISCOPAL HOSPITAL.

This paper is written with three purposes: (1) To report 23 consecutive cases of tetanus treated at the Episcopal Hospital, Philadelphia, during the last eight years; (2) by a review of the recent literature to endeavor to inculcate rational methods of treatment; and (3) in the hope that others may profit by our mistakes, as we have profited ourselves. For permission to record these case histories, as well as for the privilege of having under our personal care 11 of the patients, we desire to express our cordial thanks to the various members of the staff in whose services the patients were treated.

It is necessary first of all to inquire whether there is any such thing as a rational treatment for tetanus. We hold that treatment can be rational only when it is founded on a knowledge of the pathogenesis of the disease in question; and we believe that in the case of tetanus such knowledge exists.

Though previous generations had enough clinical acumen to class tetanus among diseases of the nervous system, and though the discovery of the Bacillus tetani by Nicolaier in 1884, and its isolation in pure culture by Kitasato in 1889, proved it to be an

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[1] Read at a meeting of the Episcopal Hospital Clinical Society, November 18, 1912.